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Claims

[c1] A process for preparing syngas, comprising:

partially oxidizing a first hydrocarbon portion with oxygen in a partial oxidation reactor to produce a first reactor effluent;

cooling the first reactor effluent to a temperature from 650°and 1000°C;

supplying the first reactor effluent to a reforming exchanger;

passing a second hydrocarbon portion with steam through a catalyst zone in the reforming exchanger to form a second reactor effluent;

discharging the second reactor effluent from the catalyst zone to form an admixture with the first reactor effluent;

passing the admixture across the catalyst zone in indirect heat exchange therewith to cool the admixture and heat the catalyst zone;

collecting the cooled admixture from the reforming exchanger.

[c2] The process of claim 1, wherein water is introduced into the first reactor effluent as a quench fluid.

[c3] The process of claim 2, wherein the cooling further comprises indirect heat exchange.

[c4] The process of claim 3, wherein the indirect heat exchange comprises heating the second hydrocarbon portion in a cross exchange.

[c5] The process of claim 1, wherein the cooling comprises heat exchange.

[c6] The process of claim 5, wherein the indirect heat exchange comprises heating the second hydrocarbon portion in a cross exchanger.

[c7] The process of claim 1, wherein the catalyst zone comprises catalyst tubes.

[c8] The process of claim 5, wherein the second hydrocarbon portion is supplied to a tube side of the reforming exchanger and passed through the catalyst tubes.

[c9] The process of claim 5, wherein the cooled first reactor effluent is supplied to a shell side inlet of the reforming exchanger.

[c10] The process of claim 7, wherein the shell side inlet is adjacent an outlet end of the catalyst tubes.

[c11] The process of claim 1 wherein the first and second hy-

drocarbon portions are supplied in a weight ratio of from 40:60 to 95:5.

[c12] The process of claim 1, wherein the first and second hydrocarbon portions are supplied in a weight ratio of from 40:60 to 60:40.

[c13] The process of claim 1, wherein the first and second hydrocarbon portions are supplied in a weight ratio of from 95:5 to 80:20.

[c14] An apparatus for producing syngas, comprising:

partial oxidation reactor means for partially oxidizing a first hydrocarbon portion with oxygen to produce a first reactor effluent;

means for cooling the first reactor effluent to a temperature from 650°to 1000°C;

means for supplying the first reactor effluent to a reforming exchanger;

means for passing a second hydrocarbon portion with steam through a catalyst zone in the reforming exchanger to form a second reactor effluent;

means for discharging the second reactor effluent from the catalyst zone to form an admixture with the first reactor effluent;

means for passing the admixture across the catalyst zone in indirect heat exchange therewith to cool the

admixture and heat the catalyst zone;

means for collecting the cooled admixture from the reforming exchanger.

[c15] A method for retrofitting a syngas process comprising a partial oxidation reaction step for converting a first hydrocarbon stream to a first reactor effluent, a heat recovery step for cooling the first reactor effluent and producing steam with the recovered heat, and a downstream processing step for receiving the cooled reactor effluent and producing a product syngas of enhanced hydrogen content, comprising:

a step for cooling the first reactor effluent to a temperature from 650°to 1000°C;

a step for diverting the cooled first reactor effluent to a reforming exchanger; a step for passing a second hydrocarbon portion with steam through a catalyst zone in the reforming exchanger to form a second reactor effluent;

a step for discharging the second reactor effluent from the catalyst zone to form an admixture with the first reactor effluent;

a step for passing the admixture across the catalyst zone in indirect heat exchange therewith to cool the admixture and heat the catalyst zone;

a step for supplying the cooled admixture from the

reforming exchanger to the heat recovery step.

a step for cooling the first reactor effluent to a temperature from 650°to 1000°C;

[c16] The method of claim 15, wherein water is introduced into the first reactor effluent as a quench fluid.

[c17] The method of claim 11, wherein the first reactor effluent is cooled by indirect heat exchange.

[c18] The method of claim 17, wherein the second hydrocarbon portion is heated by indirect heat exchange before being supplied to the reforming exchanger.

[c19] The method of claim 17 wherein water is introduced into the first reactor effluent.

[c20] The method of claim 11, wherein the catalyst zone further comprises catalyst tubes.

[c21] The method of claim 18, wherein the second hydrocarbon portion is introduced to a tube side inlet of the reforming exchanger.